

HOUSING FOR A HOUSEHOLD APPLIANCE

[001] The present invention relates to a housing for a cabinet-like household appliance, especially a refrigerating device such as a refrigerator, a bottle storage cabinet or the like.

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[002] In built-in refrigeration devices the door fitted to the appliance at the manufacturers is usually concealed in the built-in appliance behind a furniture panel which swivels when opening and closing the door. In order to deliver an aesthetically satisfactory appearance, the edges of this furniture panel must be aligned exactly to those of adjacent cabinet doors. For this purpose the furniture panel itself can be attached as a door to a furniture body receiving the refrigeration device, and the furniture panel and the door of the refrigeration device are displaceably coupled to one another so that the door of the refrigeration device can follow a swivelling movement of the furniture flap although the swivel axes of furniture panel and refrigeration device door are not the same. The furniture panel must be aligned to

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neighbouring cabinet doors using hinges which connect the furniture panel to the furniture body; precise adjustability of the refrigeration device door is not necessary.

[003] The situation is different in built-in household appliances comprising a body and a door where the door supplied by the appliance manufacturer is provided to remain visible and uncovered in the built-in position of the refrigeration device. In this case, the door of the appliance needs to be adjustable in relation to the body. In exactly the same way in household appliances having a plurality of adjacent doors, at least one door must be adjustable to align its edges so that they are flush with those of another.

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[004] In order to achieve a desired opening movement of the door of the household appliance, for example, to prevent a side of the door close to the hinge from hitting against an adjacent wall of the furniture compartment, it is frequently necessary to attach the door to the body of the appliance by means of multiple-articulation hinges. When the fixing points of these hinges are not exactly matched to one another on the body and on the door of the appliance, so that the arrangement of body, hinges and door is under internal stress, it can arise that the axes of the hinges are deflected from an exactly parallel orientation and thus execute a precessional

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movement during opening and closing of the door. The lifetime of the hinges is thereby considerably shortened.

[005] It is the object of the invention to provide a housing for a cabinet-like household
5 appliance, comprising a body and at least one door, which are connected by means of at least two multiple-articulation hinges which allows the user to align the door position using simple means and without the risk of strain which wears down the hinges.

[006] The object is solved by the door being supported on an upper supporting surface of the
10 first multiple-articulation hinge and a lower supporting surface of the second multiple-articulation hinge by means of at least one shim, preferably a large number of shims inserted between the door and at least one of the supporting surfaces. The number of shims which must be provided to mount the door free from stresses on the housing can be specified by the manufacturer of the housing, depending on the manufacturing tolerance as a standard amount
15 for a housing model or individually for each individual model; a user who wishes to adjust the height of the door at a later time can do this by moving shims from a gap between the door and one of the supporting surfaces into the gap between the door and the respectively other supporting surface. As long as the number of shims used remains the same, the suspension of the door remains stress-free.

20 [007] A heat-insulating body of the door is preferably arranged between the supporting surfaces of the hinge and in order to conceal the hinges, edge sections projecting over the heat-insulating body are formed on an outer wall of the door facing the user.

25 [008] The outer wall of the door can in particular be a glass pane. The glass pane is preferably transparent at least in a central area to allow a view into the interior of the housing; in the edge zone said pane is preferably provided with a non-transparent coating which conceals the hinges and optionally, other parts of the door.

30 [009] The door is preferably held on the supporting surface of at least one of the hinges by one or more screws. Such a screw preferably extends through an oblong hole of the

supporting surface to allow an adjusting movement of the door and the screw in the direction of the oblong hole. Thus, in addition to the degree of freedom of adjustment in the vertical direction provided by the shims, an additional degree of freedom of adjustment is provided for the door which can be oriented in any horizontal direction.

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[010] This second degree of freedom of the adjustment is preferably aligned parallel to the door.

[011] In order to facilitate the adjustment in the second degree of freedom, the multiple-
10 articulation hinge is preferably provided with a first lug connected to the supporting surface and the door is provided with a second lug opposite to the first lug which is aligned perpendicular to the alignment of the oblong hole i.e., perpendicular to the orientation of the second degree of freedom of the adjustment and is provided with holes for receiving a screw which are aligned to one another. By tightening the screw held in a thread, the two lugs can be
15 tightened precisely adjustably to one another which allows fast, tailor-made adjustment.

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[012] The thread receiving the screw can belong to a nut where the two lugs lie between the nut and the head of the screw; however, the thread is preferably formed by the hole in one of the lugs.

[013] The hole in the other lug can be a vertically aligned oblong hole.

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[014] The second lug can be a fixed component of the door; in this case, the vertically aligned oblong hole would be required to receive height fluctuations of the door in relation to the first
lug resulting from the displacement of shims. However, the second lug preferably comprises a part of a component which can be detachably screwed onto the door. The shims are then appropriately dimensioned so that when mounted, they not only extend between the supporting surface of the multiple-articulation hinge and the door but also between the component bearing the second lug and the door so that the height of this component does not
30 vary in relation to the multiple-articulation hinge even when the height of the door is varied by moving the shims.

[015] Further features and advantages of the invention are obtained from the following description of exemplary embodiments with reference to the appended figures. In the figures:

5 [016] Figure 1 is a perspective view of a wine storage cabinet as an example of a household appliance having a housing according to the invention;

[017] Figure 2 is a vertical section through the door of the wine storage cabinet;

10 [018] Figure 3 is an exploded view of a multiple-articulation hinge and other components which interconnect the door and the body of the wine storage cabinet; and

[019] Figure 4 is a partial cutaway view of the components from Fig. 3 according to a modified embodiment.

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[020] Figure 1 shows a perspective view of a bottle storage cabinet as an example of a household appliance to which the present invention is applied.

20 [021] The body 1 of the bottle storage cabinet is provided for building into a furniture cavity (not shown). However, whereas in most built-in refrigeration devices in the built-in state, the front of the door is covered by a furniture panel, the door 2 of the appliance shown here is provided to remain freely visible in the built-in state.

25 [022] An outer wall of the door 2 is formed by a glass panel 3 which is stuck to a rectangular metal frame 4 at its back. A movable element of a multiple-articulation hinge 5, 6 acts on an upper side and a lower side of the frame. An inner glass panel 7 (see Fig. 2) is connected to the outer glass panel 3 by means of a second rectangular frame 8 which is surrounded by the frame 4 without touching it. An intermediate space 9 sealed in an airtight manner, defined by the two glass panels 3, 7 and the frame 8, is filled with a heat-insulating gas.

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[023] In its edge zone at the back, the glass panel 3 is provided with an opaque coating 10 which conceals the frames 4, 8 from the view of an observer standing in front of the bottle storage cabinet. In a central area of the door, both glass panels 3, 7 are transparent and allow the interior of the body 1 to be viewed. Located therein are a plurality of bottle racks 11, each
5 formed by front and rear horizontal supports 12 and cylinder-segment-shaped shells 13 suspended between the supports.

[024] A handle 14 attached to the outer glass panel 3 is screwed into the outer frame 4 through two holes in the glass panel 3.

10 [025] The four sides of the outer frame 4 are each composed of an outer profile 15, an inner profile 16 and a magnetic sealing strip 17 anchored between the two profiles 15, 16 by a tongue and groove joint, which seals the closed door 2 at the front of the body 1. The inner profile 16 directly adjacent to the interior of the refrigeration device and the outer profile 15 in
15 contact with the ambient air are insulated from one another by the magnetic sealing strips 17 and its inner cavities. Clamped between the inner profile 16 and the inner glass panel 7 is a flexible sealing strip 18 which prevents cold air from the interior of the appliance from penetrating between the frames 4, 8 as far as the outer glass panel 3.

20 [026] Of the multiple-articulation hinges 5,6 known per se and therefore not described in further detail here, Fig. 2 shows only one movable hinge element 19 to which an L-shaped support element 20 in the cross-section in Fig. 2 is screwed. The support element 20 of the lower multiple-articulation hinge has an upper supporting surface 22 on which a lower side of the frame 4 rests, separated by a plurality of rectangular shims 23. The horizontal leg of the
25 lower support element 20 forming the supporting surface 22 is connected to the frame 4 by one or more screws 24 which extend through holes in the leg and the shims 23 of the plastic injection moulding and engage in an inner thread of the outer profile 15.

30 [027] In mirror symmetry hereto, the support element 20 of the upper multiple-articulation hinge 5 has a lower supporting surface 21 facing the frame 4 and a gap between this

supporting surface 21 and the frame 4 is filled by shims 23 free from play. The upper support element 20 is screwed to the frame 4.

[028] Figure 3 is an exploded view showing the lower multiple-articulation hinge 6 comprising its movable hinge element 19, the support element 20 screwed thereto and three shims 23 for filling a gap between the supporting surface 22 and the frame 4 which is not shown in this figure. It can be seen that the holes 25 in the horizontal leg of the support element 20 are oblong holes which are aligned parallel to the level of the door 2. A lug 26 is bent at right angles at one longitudinal end of the vertical leg of the support element 20. A tapped hole 27 passes through the lug 26.

[029] An angle element 28 has a vertical leg 29 which lies parallel and opposite to the lug 26 and wherein a vertically aligned oblong hole 30 in alignment with the tapped hole 27 is formed. Another hole 31 is formed in a horizontal leg 32 of the angle element 28 facing the frame 4. The angle element 28 is provided so that the shims 23 can be screwed to the frame 4 using a screw (not shown) through the hole 31 and holes 33 in alignment therewith.

[030] The following procedure can be adopted to adjust the door 2: firstly the amount by which the height of the door 2 is to be corrected is measured on the bottle storage cabinet completely mounted in the furniture cavity provided for it. The door is dismantled by loosening the screws 24 joining the horizontal legs of the support elements 20 to the frame 4. According to the desired change in height, the number of shims 23 on the lower supporting element 20 is reduced or increased by shims which were mounted previously between the frame and the upper supporting element 20. The door 2 is then inserted again, all the remaining spacers 23 being inserted between the frame 4 and the upper support element 20. However, the screws 24 between the support elements and the frame are not yet tightened so that the door can still be displaced parallel to its front side to the extent specified by the extension of the oblong holes (25).

[031] The door is now first pulled to the right relative to the perspective in Fig. 3 so that the screws 24 each push against the right edge of the oblong holes (25). Then, respectively one

screw 34 is screwed into the tapped holes 27 of the two support elements 20 through the oblong holes 30 of the two angle elements 28. The head of the screw 34 then finally pushes against the vertical leg 29 so that when the screw 34 is turned further over the angle element 28, the door is shifted to the right. Then, following the height adjustment the position of the door is continuously adjusted in the lateral direction and with high accuracy.

[032] Figure 4 shows the support element 20, the angle element 28 and shims 23 resting thereon according to a modified embodiment. In this embodiment, a tapped hole 35 into which a screw 36 engages, is formed in addition to the oblong hole 30 in the vertical leg 29 of the angle element 28. This tapped hole 35 is not opposite to any opening in the lug 26. The screw 36 which thus presses with its tip against the lug 26 can be used to shift the door precisely and continuously to the right during the adjustment or to counter the screw 34 and thus fix the door in an adjusted horizontal position.